



## The Context

A need to redesign the supply chain

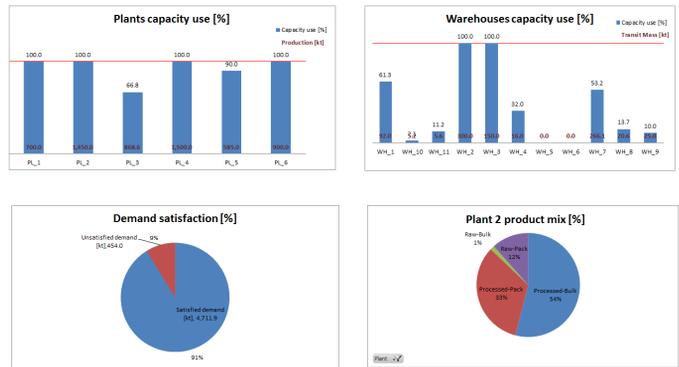
A large global commodity producer is facing increasing competitive pressure due to the combined entry of a new competitor using a lower cost technology and the unfavourable evolution of foreign exchange rates.

As its market share and margins are at risk, the Company is looking at different scenarios to reconfigure its global production and distribution network and hence restore the profitability of its business.

## The Challenge

A dedicated “light” and flexible tool

Even though most data necessary for such simulations are already consolidated in their ERP system, the Supply Chain Team felt they needed a dedicated tool for such assignment for several reasons:



- **What-if analysis:** Many different scenarios must be tested, some of them being really “out of the box” ones, without affecting the daily operations.
- **Confidentiality:** Strategic “sensitive” decisions are at stake (e.g. closing plants, dropping customer, etc.), thus the simulations must remain confidential (not easy in ERP).
- **Flexibility & usability:** Sufficient flexibility is required to quickly investigate many cases and easily perform calculations on the input and output data, plus have a clear framework to report to the Management Board.



### The Solution

#### A strategic model of the supply chain

N-Side has built **NODE**, a high level model of the entire supply chain, including production facilities, warehouses, routes and local demands.

**NODE** include all decisions that the client wants to investigate as **decision variables**, such as:

- Plant opening or closure
- Plant production level
- Warehouse opening or closure
- Warehouse transit mass
- Flow on each route (approach or lane)
- Proportion of each demand satisfied

**NODE** also model all **constraints** specific to the supply chain, such as:

- Min/max production capacities
- Yields and co-products generation
- Treatment and packaging capacities
- Max capacities of outgoing transports, per mode
- Min/max transit capacity at warehouses
- Demand satisfaction constraint (which can be relaxed)
- Min max capacities on the routes (per transport)

All associated **costs** are also computed, such as:

- Fixed production costs
- Variable production costs, computed based on marginal cost curve to maximize the actual profitability of the network.
- Transit costs at warehouses
- Transportation costs
- Penalties for non-satisfaction of several constraints (e.g. min transportation volumes)

By combining all supply chain costs with the revenues of local demands, **NODE** finds the solution that **maximizes the profit of the integrated supply chain**.

In order to **assess the profitability of each plant**, n-Side has developed an algorithm to backtrack costs and revenues in the network to allocate them properly to each plant.

All costs are also tracked in their original currency and converted to the Client's domestic currency to **model the FX risk exposure of the supply chain**.



### The Benefits

Using **NODE**, the Supply Chain Team is now able to perform several simulations, such as:

- **Optimizing the whole network** (including on/off decisions on plant and warehouse) for the current demand level to build or review distribution plans.
- **Simulating the attrition of part of their demand to competition** and the impact on their P&L in the current network configuration. Then letting the model adapt the network (e.g. reviewing plants & warehouse activity) to maximize the profit.
- **Assessing the profitability of the demand** by letting the model drop non-profitable demand, in order to evaluate the “cost” of their market shares.
- **Simulating the impact of FX rate variations** and identify the appropriate decisions.
- **Evaluating the profitability of investments**, such as modernizing a plant to alleviate a productivity bottleneck.
- **Finding the optimal transportation modes** for each lane and approach.

These simulations led to **several non-trivial findings** that could be understood and accepted thanks to the detailed reporting offered by **NODE**. For instance, accepting to drop non-profitable customers and adapt the network accordingly could help double the overall profit of the supply chain.



Altogether, the SC Strategic Team was able to provide the Board with **quantitative, objective and robust advises** regarding the most relevant decisions to adapt the production and distribution network to the changing environment.

Since then, **NODE is used on a regular basis** to build and update strategic distribution plans and for contingency planning, filling a gap in the set of IT tools available for strategic and tactical planning in the organization.

*At the end of the implementation, the project sponsor also pinpointed some additional benefits :*

- **A tool for management, really designed to support decision making:** reporting highlights the most relevant KPI's, visualization tool enables to quickly compare the results of different simulations on a map (featuring plants, warehouses and flows), assumptions and level of details are appropriate for strategic planning.
- **Simplicity of use and deployment:** Excel based application, barely no deployment effort and cost, portable too. All classical Excel features for data analysis and drill down remain available.
- **Swiftness of the project:** the model was delivered only one month after the kick-off and the internal team was able to present recommendations to the management one month later!